

UTILITY PATENT APPLICATION TRANSMITTAL

(Large Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.
C32-113919M/TH

Total Pages in this Submission

TO THE ASSISTANT COMMISSIONER FOR PATENTS

Box Patent Application
Washington, D.C. 20231

Transmitted herewith for filing under 35 U.S.C. 111(a) and 37 C.F.R. 1.53(b) is a new utility patent application for an invention entitled:

FAN MOTOR AND HEAT SINK BUILT-IN TYPE FAN MOTOR

and invented by:

Hiroyuki Shingai and Shinya Minakuchi

If a CONTINUATION APPLICATION, check appropriate box and supply the requisite information:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: _____

Which is a:

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Enclosed are:

Application Elements

1. ☒ Filing fee as calculated and transmitted as described below
2. ☒ Specification having 21 pages and including the following:
 - a. ☒ Descriptive Title of the Invention
 - b. ☐ Cross References to Related Applications (if applicable)
 - c. ☐ Statement Regarding Federally-sponsored Research/Development (if applicable)
 - d. ☐ Reference to Microfiche Appendix (if applicable)
 - e. ☒ Background of the Invention
 - f. ☒ Brief Summary of the Invention
 - g. ☒ Brief Description of the Drawings (if drawings filed)
 - h. ☒ Detailed Description
 - i. ☒ Claim(s) as Classified Below
 - j. ☒ Abstract of the Disclosure

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Application Elements (Continued)

3. ☒ Drawing(s) *(when necessary as prescribed by 35 USC 113)*

a. ☐ Formal Number of Sheets _____

b. ☒ Informal Number of Sheets 5 (Figs. 1-8)

4. ☒ Oath or Declaration

a. ☒ Newly executed *(original or copy)* ☐ Unexecuted

b. ☐ Copy from a prior application (37 CFR 1.63(d)) *(for continuation/divisional application only)*

c. ☒ With Power of Attorney ☐ Without Power of Attorney

d. ☐ DELETION OF INVENTOR(S)

Signed statement attached deleting inventor(s) named in the prior application,
see 37 C.F.R. 1.63(d)(2) and 1.33(b).

5. ☐ Incorporation By Reference *(usable if Box 4b is checked)*

The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

6. ☐ Computer Program in Microfiche *(Appendix)*

7. ☐ Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all must be included)*

a. ☐ Paper Copy

b. ☐ Computer Readable Copy *(identical to computer copy)*

c. ☐ Statement Verifying Identical Paper and Computer Readable Copy

Accompanying Application Parts

8. ☒ Assignment Papers *(cover sheet & document(s))*

9. ☐ 37 CFR 3.73(B) Statement *(when there is an assignee)*

10. ☐ English Translation Document *(if applicable)*

11. ☐ Information Disclosure Statement/PTO-1449 ☐ Copies of IDS Citations

12. ☐ Preliminary Amendment

13. ☒ Acknowledgment postcard

14. ☐ Certificate of Mailing

☐ First Class ☐ Express Mail *(Specify Label No.):* _____

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Accompanying Application Parts (Continued)

15. ☒ Certified Copy of Priority Document(s) (if foreign priority is claimed)

16. ☒ Additional Enclosures (please identify below):


Notice of Change of Address

Fee Calculation and Transmittal

CLAIMS AS FILED

For	#Filed	#Allowed	#Extra	Rate	Fee
Total Claims	19	- 20 =	0	x \$18.00	\$0.00
Indep. Claims	4	- 3 =	1	x \$78.00	\$78.00
Multiple Dependent Claims (check if applicable) <input type="checkbox"/>					\$0.00
BASIC FEE					\$760.00
OTHER FEE (specify purpose) Assignment Recordation					\$40.00
TOTAL FILING FEE					\$878.00

- ☒ A check in the amount of **\$878.00** to cover the filing fee is enclosed.
- ☒ The Commissioner is hereby authorized to charge and credit Deposit Account No. **50-0481** as described below. A duplicate copy of this sheet is enclosed.
- ☐ Charge the amount of _____ as filing fee.
- ☒ Credit any overpayment.
- ☒ Charge any additional filing fees required under 37 C.F.R. 1.16 and 1.17.
- ☐ Charge the issue fee set in 37 C.F.R. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).


Signature

Dated: May 18, 1999

Sean M. McGinn, Esq.
Registration No.: 34,386

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**APPLICATION
FOR
UNITED STATES
LETTERS PATENT**

APPLICANTS: **Hiroyuki Shingai and Shinya Minakuchi**

FOR: **FAN MOTOR AND HEAT SINK
BUILT-IN TYPE FAN MOTOR**

DOCKET NO.: **C32-113919M/TH**

FAN MOTOR and HEAT SINK BUILT-IN TYPE FAN MOTOR

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a heat sink built-in type fan motor or a fan motor, which is mounted on an upper surface of an electronic component to be cooled. In particular, the present invention relates to the structure of a heat sink built-in type fan motor which is used for cooling a CPU in a personal computer, a fan motor used in a compact portable electronic equipment, etc.

Related Art

Compact and high-performance electronic equipment has been developed according to the recent progress in electronic technology. The electronic equipment requires forcible cooling using a fan motor or the like since the electronic components are integrated therein with high density, and the heat generated therefrom cannot be released sufficiently by natural air cooling.

The degree of integration has increased particularly in CPUs, and there has arisen a need to provide a fan motor and a heat sink on an upper portion of the CPU. The typical structure of a heat sink built-in type fan motor is shown in Fig. 8.

In Fig. 8, reference numeral 50 denotes a cooling plate

which is secured to a CPU, a RAM, or the like. The cooling plate 50 is provided at its central portion with a cooling hole 51 for allowing cooling air from a fan motor 100 to pass therethrough. On the other hand, the fan motor 100 has an attaching plate 120 which is disposed on and attached to a lower portion of a cooling fan section (a motor main body portion and a cooling blade portion) 110.

The fan motor 100 is fixed to the cooling plate 50 in such a manner that the attaching plate 120 is placed on the upper surface of the cooling plate 50, and then the attaching plate 120 is fixed to the cooling plate 50 using screws extending downwardly.

A signal line (lead wires) 150 for supplying a motor drive signal is led from the attaching plate 120 and secured to the cooling plate 50 using an adhesive agent, a thermosetting resin, or the like as shown by 200 in Fig. 8. Alternatively, the signal line 150 may be clamped by a clamp member that is fixed to the cooling plate 50 using screws.

In recent years, the demand directed to making the electronic equipment compact in size has been increased more and more, and a compact and thin fan motor portion has been required for the electronic equipment accordingly. Various attempts have been made to make the motor portions compact and thin, but are still insufficient to satisfy the recent increased demand requiring a more compact, thinner fan motor portions.

Besides, it is also pointed out that the attachment of the signal line using an adhesive agent or the like requires the increased number of manufacturing steps, and is deficient in reliability. The attachment of the signal line using the clamp member makes the structure complex, and increases the manufacturing cost.

SUMMARY OF THE INVENTION

It is an object of the present invention to overcome the above-described problems and provide a fan motor and a heat sink built-in type fan motor which are thin.

To reduce the overall thickness of a fan motor or a heat sink built-in type fan motor, the present invention provides a structure for mounting a first plate member associated with a motor portion of a fan motor onto a second plate member having a first side and a second side opposite from said first side. The structure includes an opening portion formed through the second plate member, at least one recessed portion provided in the first side of the second plate member and located outwardly with respect to the opening portion, and at least one leg portion provided to the first plate member, and received by the recessed portion so that the motor portion is at least partially located in the second side.

A heat sink built-in type fan motor according to an embodiment of the present invention comprises: a cooling plate

to be mounted to an electronic component; a fan motor attached to the cooling plate; and an attaching plate in which a leg portion for fixing the fan motor to the cooling plate is provided in a peripheral portion of the attaching plates. The cooling plate
5 has a hole portion at least as large as the attaching plate, and a recessed portion that is formed on an attaching surface side of the cooling plate to the electronic component and that accommodates at least the leg portion of the attaching plate therein.

10 The heat sink built-in type fan motor is assembled such that the attaching plate is passed through the hole portion; the attaching plate is rotated so that the leg portion is accommodated in the recessed portion, and then the leg portion is fixed to the cooling plate fan from the attaching surface side.

15 A heat sink built-in type fan motor according to an embodiment of the present invention is characterized in that a recessed portion capable of accommodating an attaching plate of a fan motor is provided in a cooling plate of a heat sink on a side thereof which is to be mounted on an electronic component,
20 and the attaching plate is fixed from an attaching surface side of the cooling plate to the electronic component in a state that the attaching plate is accommodated in the recessed portion .

In each of the heat sink built-in type fan motors, it is preferable that the cooling plate has a retaining portion capable

of retaining a signal line, the retaining portion including a tongue portion provided in a central portion thereof and a space portion surrounding the tongue portion to permit the signal line to pass therethrough across the tongue portion, and wherein the retaining portion retains the signal line by allowing the signal line to pass between the tongue portion and the cooling plate.

A fan motor according to an embodiment of the present invention comprises: a motor portion having a fan blade, a casing having a central portion to which the motor portion can be attached, the central portion defining an air blowing hole, and an attaching plate for holding the motor portion. The attaching plate has an attaching leg a distal end portion of which is located radially outwardly relative to the air blowing hole when the motor portion is attached to the casing. The casing has on its bottom side an attaching recessed portion capable of accommodating at least the distal end portion of the attaching leg portion.

The fan motor is assembled such that the motor portion is accommodated in the air blowing hole from the bottom side of the casing, and then the attaching leg portion is fixed to the casing in a state that the attaching leg portion is accommodated in the accommodating recessed portion.

In the above-described arrangements, since the thickness of the fan-motor attaching plate is not added to the thickness of the heat sink, it is possible to make a heat sink built-in type

fan motor thin. Further, it is possible to positively prevent the lifting up of the signal line with a simple arrangement. Since the thickness of the fan attaching member is not added to the thickness of the fan motor, it is possible to provide a thin fan motor.

The present disclosure relates to the subject matter contained in Japanese patent application No. Hei. 10-140025 (filed on May 21, 1998), which is expressly incorporated herein by reference in its entirety.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

Fig. 1 is a diagram explaining the outline of an embodiment of the present invention;

Fig. 2 is a diagram illustrating the structure of a fan motor portion in accordance with the embodiment;

Fig. 3 is a diagram illustrating a cross section of a cooling plate in accordance with the embodiment;

Figs. 4 and 5 are diagrams explaining the procedure for fixing the fan motor to the cooling plate in this embodiment;

Fig. 6 is a top plan view of a fan motor in accordance with a second embodiment of the present invention;

Fig. 7 is a bottom view of the fan motor in accordance with the second embodiment; and

Fig. 8 is a diagram illustrating a typical structure of

a related heat sink built-in type fan motor.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, a detailed description will be given of the embodiments of the present invention.

5 First Embodiment of the Invention

Figs. 1 to 5 shows heat sink built-in type fan motor according to a first embodiment of the present invention.

10 This embodiment is featured as follows: A hole substantially similar to but slightly larger than an attaching plate of a fan motor is formed in a bottom plate, i.e. a cooling plate of a heat sink. The attaching plate of the fan motor is passed through this hole to be located at the rear side of the heat sink, and then rotated and positioned to the attaching position on the rear side of the heat sink. The heat sink has
15 a recessed portion (recessed portions) on the rear side thereof, each having a depth corresponding to the thickness of the attaching plate of the fan motor. The attaching plate of the fan motor at the attaching position is received by and accommodated in the recessed portion(s) of the heat sink. The fan motor is fixed to
20 the heat sink under this condition.

A signal line (lead wires) for driving the fan motor is passed laterally through a bridge portion in a hole or a recessed portion provided in the heat sink, thereby preventing the lifting up of the signal line and preventing the contact of the blades

with the signal line. Hereafter, a description will be given specifically with reference to Fig. 1 to 5. In the drawings, arrangements that are similar to those shown in Fig. 8 referred to before are denoted by the same reference numerals.

5 Reference numeral 100 denotes a fan motor. The fan motor 100 is attached to an attaching plate 120. Three leg portions 125 are provided at equal angular intervals in peripheral portion of the attaching plate 120 for fixing the fan motor 100 to a cooling plate 50. An attaching hole 126 is formed in a substantially
10 central portion of a distal end portion of each leg portion 125.

 The cooling plate 50 is secured to an upper surface of an electronic component to be cooled, e.g., a CPU or an MPU. The cooling plate 50 is provided with a cooling hole 51 designed to permit the attaching plate 120 to pass therethrough toward the
15 rear surface side of the cooling plate 50. Three attaching recessed portions 55 each having a depth at least as large as the thickness of the leg portion 125 are provided on the rear surface side of the cooling plate 50.

 The cooling hole 51 is formed with notched portions 52
20 for permitting the respective leg portions 125 to pass therethrough. As shown in Figs. 4 and 5, the attaching recessed portion 55 on the rear surface side is in the form of an arcuate groove continuing from the corresponding notched portion 52, so that the leg portion 125, which has passed through the notched

portion 55, can be rotated along the groove through a predetermined angle to the attaching position. The attaching recessed portion 55 is provided with a tapped hole 56 which mates with the attaching hole 126 when the leg portion 125 has been rotated through the predetermined angle to the attaching position. With this arrangement, the fan motor 100 can be attached to the cooling plate 50 in such a manner that the attaching holes 126 and the tapped holes 56 are aligned with each other after the leg portions 125 are accommodated in the attaching recessed portions 55, and then screws are fastened to the tapped holes 55 from the rear surface side of the plate 50.

It should be noted that the attaching recessed portions 55 are not limited in configuration to those shown in Figs. 4 and 5. For example, they may not necessarily continue from the notched portions 56 as far as they are recessed portions capable of accommodating the leg portions 125. Further, the method of fixing the leg portions 125 is also not limited to the threaded engagement with the tapped holes 56, and an arrangement may be alternatively employed such that fixing holes are provided instead of the tapped holes, nuts are provided over the fixing holes, and the screws are passed through the attaching holes 126 and the fixing holes from the rear surface side and are fixed by being threadedly engaged with the nuts. Still alternatively, the holes aligned with each other may be fixed together by eyelets or the like.

Furthermore, the two members may be fixed to each other by caulking or the like. Any suitable fixing method is applicable.

As shown in Fig.1 and 3, a signal-line retaining portion 60 is provided for retaining the signal line 150 at a position spaced apart a predetermined distance from the cooling hole 51 in the cooling plate 50. This signal-line retaining portion 60 includes a hole portion 62 in which the signal line 150 can be inserted, and a tongue portion 61 projecting in a central portion of the hole portion 62 for retaining the signal line. As shown in Fig. 3, the signal line 150 is inserted in the hole portion 62, and is passed under the lower side of the tongue portion 61, thereby securing the signal line 150.

It is preferable to form a lower portion of the tongue portion 61 into an arcuate shape to provide a slightly thicker distal end portion and a thin intermediate portion, in order for the tongue portion 61 to more positively retain the signal line and more positively prevent the removal of the signal line. In addition, instead of forming the hole portion 62, this signal-line retaining portion 60 may be formed by a recessed portion (cavity portion) insofar as it is capable of allowing the signal line 150 to pass under the lower side of the tongue portion 61.

Hereafter, a description will be given of a method of attaching the fan motor 100 to the cooling plate 50 in accordance with this embodiment configured as described above.

First, the attaching plate 120 of the fan motor 100 is inserted in the cooling hole 51 of the cooling plate 50 of the heat sink, so that the attaching plate 120 is located at the rear side of the cooling plate 50.

5 Subsequently, the attaching plate 120 of the fan motor 100 is rotated along the attaching recessed portions 55, and is positioned to the attaching position on the cooling plate 50.

Then, the attaching plate 120 of the fan motor 100 is fixed to the cooling plate 50 (by screwing, caulking, eyeleting, etc.).

10 Finally, the signal line (lead wires) 150 is passed through the hole or cavity portion 62 across the lower side of the tongue portion 61 to be retained at the signal-line retaining portion 60.

15 In accordance with this embodiment described above, the attaching plate can be accommodated in the recessed portions provided in the bottom surface of the heat sink (cooling plate). Therefore, the attaching plate can be attached to the heat sink such that the thickness of the fan-motor attaching plate is not added to the thickness of the heat sink (cooling plate), which
20 contributes to making a heat sink built-in type fan motor thin.

In particular, in the case of a heat sink built-in type fan which is mounted on a high-speed CPU chip or the like generating the larger amount of heat, the overall thickness is the sum of the thickness of the CPU chip, the thickness of the heat sink

portion and the thickness of a substrate on which they are mounted, so that the demand for a thin heat sink portion, in particular, is high. By adopting the above-described arrangement, it is possible to meet the demand for a thin heat sink portion without deteriorating the performance of the heat sink.

Further, it is possible to positively prevent the lifting up of the signal line with a simple arrangement. In particular, since the signal line can be retained without using a particular jig after the fan motor is fixed to the cooling plate, the signal line (lead wires) can be fixed irrespective of the size of a connector or the like.

Further, since the fan motor can be attached from the rear surface side, the fan motor can be easily attached to the cooling plate without being obstructed by the cooling fan of the fan motor.

Second Embodiment

In the above, a description has been given of an example of a heat sink built-in type fan motor, in which the fan motor is attached to the heat sink (cooling plate). The second embodiment is directed to a fan motor per se since a thinner fan motor is similarly required for making an electronic equipment, such as a portable electronic equipment, thinner and more compact.

Referring to Figs. 6 and 7, a description will be given of the second embodiment of the present invention.

If the attaching plate, to which a motor body and a blade portion of the fan motor are attached, is directly fixed to an upper portion of a casing of the fan motor, the thickness of the motor portion and the attaching portion is added to the thickness of the casing portion, and thus the overall thickness is large.

Accordingly, similarly to the first embodiment, the second embodiment employs a recessed portion (recessed portions) capable of accommodating attaching and fixing portions of the attaching plate in a bottom portion (a rear surface side) of the fan motor casing. The attaching and fixing portions of the attaching plate are accommodated in the recessed portions of the fan motor casing.

Consequently, the overall thickness of the fan motor can be made a smaller one of the sum of the thickness of the casing and the motor portion and the sum of the attaching plate and the motor portion at maximum. Hence, in a case where the casing is formed by a plate-like member to which the attaching plate can be fixed, the overall thickness of the fan motor can be reduced to the sum of the thickness of the attaching plate and the motor portion.

In the second embodiment shown in Figs. 6 and 7, reference numeral 300 denotes a motor portion; 310 denotes a blade portion of the motor; and 320 denotes an attaching plate for attaching the motor portion 300 to a casing 500. The attaching plate 320 is provided with three radially-projecting attaching legs 330 arranged at equal angular intervals. Attaching holes 335 are

provided in distal end portions of the attaching legs 330.

The casing 500 is formed of a plate-like member, to which the motor portion 300 is attached. An air blowing hole 550 of a diameter slightly larger than the diameter of the blade portion 310 of the motor 300 is provided in a central portion of the casing 500. Further, attaching recessed portions 560 capable of accommodating the arm portions 330 of the attaching plate and having a depth at least as large as the thickness of the attaching plate 320 are provided in a bottom surface portion of the casing 500. Tapped holes are provided in the attaching recessed portions 560.

To install the motor portion 300 in the casing 500, the motor portion 300 is inserted in the air blowing hole 550 from the bottom surface side of the casing portion 500, and the attaching legs 330 are accommodated in the attaching recessed portions 560. Then, attaching screws are inserted in the attaching holes 335 in the attaching legs 330, and are threadedly engaged with the tapped holes in the casing 500, thereby attaching the motor portion to the casing 500.

This attachment is not limited to screwing, and an arrangement may be alternatively provided such that fixing holes are provided instead of the tapped holes, nuts are provided over the fixing holes, and the screws are passed through the attaching holes 335 and the fixing holes from the rear surface side and are

fixed by being threadedly engaged with the nuts. Still alternatively, the holes aligned with each other may be fixed together by eyelets or the like. Furthermore, the two members may be fixed to each other by caulking or the like. Any suitable
5 fixing method is applicable.

In accordance with the second embodiment described above, the thickness of the fan-motor attaching member is not added to the thickness of the fan motor, it is possible to make a fan motor thin.

WHAT IS CLAIMED IS:

1. A heat sink built-in type fan motor comprising:
a cooling plate to be mounted to an electronic component;
a fan motor attached to said cooling plate; and

5 an attaching plate in which a leg portion for fixing said fan motor to said cooling plate is provided in a peripheral portion of said attaching plate,

10 wherein said cooling plate has a hole portion at least as large as said attaching plate, and a recessed portion that is formed on an attaching surface side of said cooling plate to said electronic component and that accommodates at least said leg portion of said attaching plate therein.

15 2. A method of assembling said heat sink built-in type fan motor according to claim 1, said method comprising the steps of

passing said attaching plate through said hole portion;
rotating the attaching plate so that said leg portion is accommodated in said recessed portion; and

20 fixing said leg portion to said cooling plate fan from said attaching surface side.

3. The heat sink built-in type fan motor according to claim 1, wherein said cooling plate has a retaining portion capable of retaining a signal line, said retaining portion including a tongue portion provided in a central portion thereof

and a space portion surrounding said tongue portion to permit the signal line to pass therethrough across said tongue portion, and wherein said retaining portion retains the signal line by allowing the signal line to pass between said tongue portion and said cooling plate.

4. A heat sink built-in type fan motor, wherein a recessed portion capable of accommodating an attaching plate of a fan motor is provided in a cooling plate of a heat sink on a side thereof which is to be mounted on an electronic component, and said attaching plate is fixed from an attaching surface side of said cooling plate to the electronic component in a state that said attaching plate is accommodated in said recessed portion .

5. The heat sink built-in type fan motor according to claim 4, wherein said cooling plate has a retaining portion capable of retaining a signal line, said retaining portion including a tongue portion provided in a central portion thereof and a space portion surrounding said tongue portion to permit the signal line to pass therethrough across said tongue portion, and wherein said retaining portion retains the signal line by allowing the signal line to pass between said tongue portion and said cooling plate.

6. A fan motor comprising:
a motor portion having a fan blade;
a casing having a central portion to which said motor

portion can be attached, said central portion defining an air blowing hole; and

an attaching plate for holding said motor portion, said attaching plate having an attaching leg a distal end portion of which is located radially outwardly relative to said air blowing hole when said motor portion is attached to said casing,

wherein said casing has on its bottom side an attaching recessed portion capable of accommodating at least said distal end portion of said attaching leg portion.

7. A method of fixing the fan motor according to claim 6, comprising the steps of:

accommodating said motor portion in the air blowing hole from said bottom side of said casing; and

fixing said attaching leg portion to said casing in a state that said attaching leg portion is accommodated in said accommodating recessed portion.

8. A structure for mounting a first plate member associated with a motor portion of a fan motor onto a second plate member having a first side and a second side opposite from said first side, said structure comprising:

an opening portion formed through said second plate member;

at least one recessed portion provided in said first side of said second plate member and located outwardly with respect

to said opening portion; and

at least one leg portion provided to said first plate member, and received by said recessed portion so that said motor portion is at least partially located in said second side.

5 9. The structure according to claim 8, wherein said first plate member includes an attaching plate attached to said fan motor including said motor portion and a motor casing, and said second plate member includes a cooling plate.

10 10. The structure according to claim 8, wherein said first plate member includes an attaching plate supporting said motor portion, and said second plate member includes a motor casing.

15 11. The structure according to claim 8, wherein a depth of said recessed portion is as large as a thickness of said leg portion.

 12. The structure according to claim 8, further comprising:

20 at least one notched portion provided to said second plate member to define an outwardly expanded perimeter of said opening portion, said notched portion being adjacent to said recessed portion.

 13. The structure according to claim 12, further comprising:

 a groove provided to said first side of said second plate

member to connect said notched portion to said recessed portion.

14. The structure according to claim 8, wherein said opening portion is circular, and said recessed portion is located radially outwardly of said opening portion.

5 15. The structure according to claim 8, wherein three of said recessed portions are provided to said second plate member.

16. The structure according to claim 8, wherein three of said leg portions are provided to said first plate member.

10 17. The structure according to claim 8, further comprising:

a hole portion provided to said second plate member;

15 a tongue portion provided to said second plate member and extending in a central portion of said hole portion, said tongue portion being spaced from each of opposing side edges of said hole portion.

18. The structure according to claim 17, wherein said hole portion includes a through-hole.

19. The structure according to claim 17, wherein said hole portion includes a blind-hole.

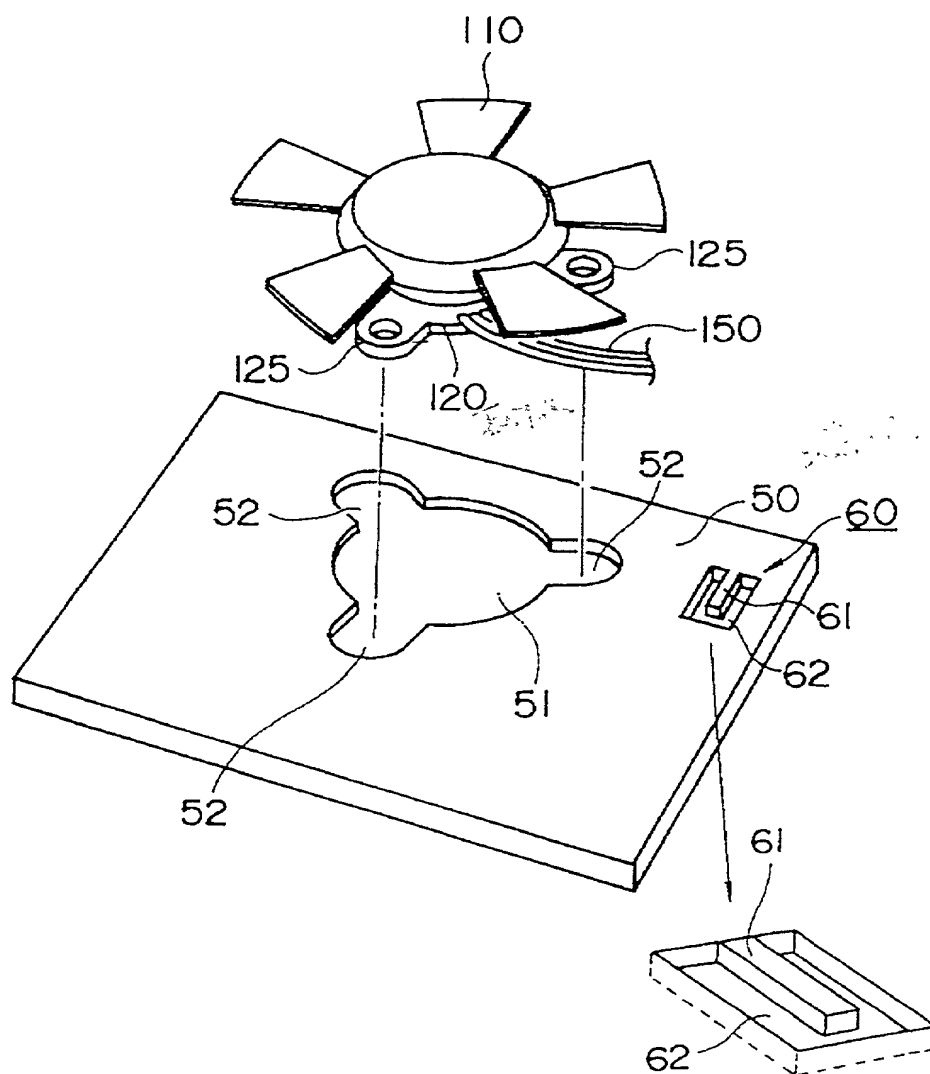
ABSTRACT OF THE DISCLOSURE

A heat sink built-in type fan motor, which is mounted on an upper surface of an electronic component to cool the electronic component. The heat-sink built-in type fan motor includes a fan motor and a cooling plate to which the fan motor is fixed. The fan motor includes a motor portion having cooling blades and an attaching plate having leg portions formed in its peripheral portions to fix the motor portion to the cooling plate. The cooling plate has a hole portion substantially as large as the attaching plate 120, and recessed portions capable of accommodating at least the leg portion therein. The attaching plate is passed through the hole portion toward the rear surface side and is rotated so that the leg portions are accommodated in the recessed portions.

【書類名】 図面

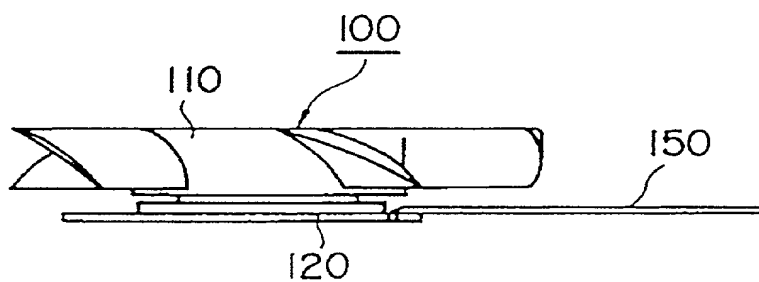
【図1】

Fig. 1

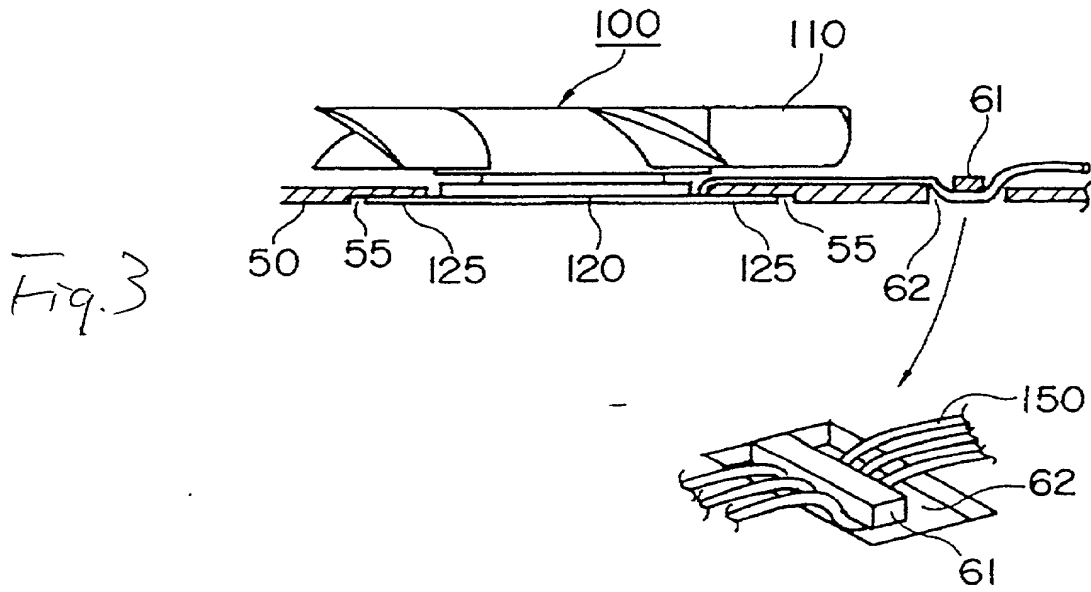


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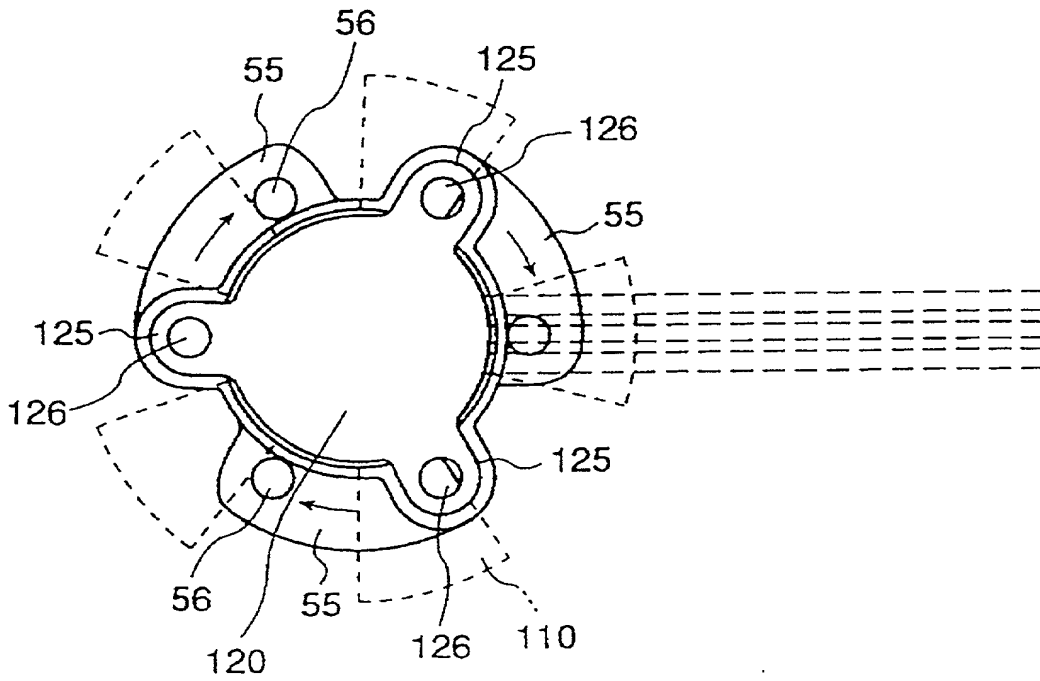
Fig. 2



【図3】



【図4】



【図5】

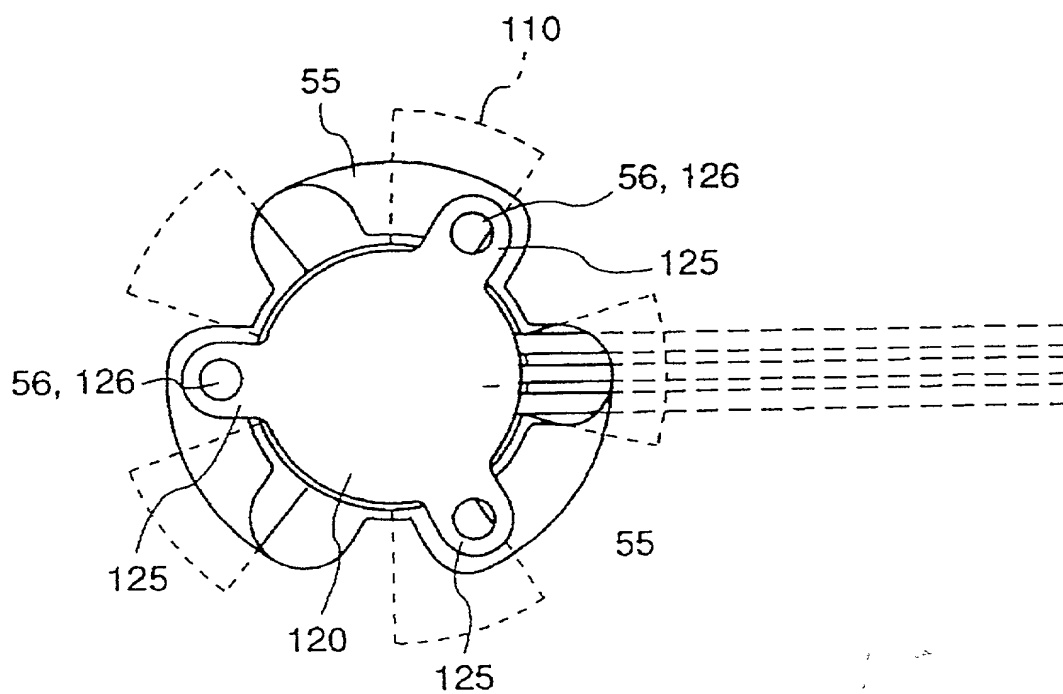
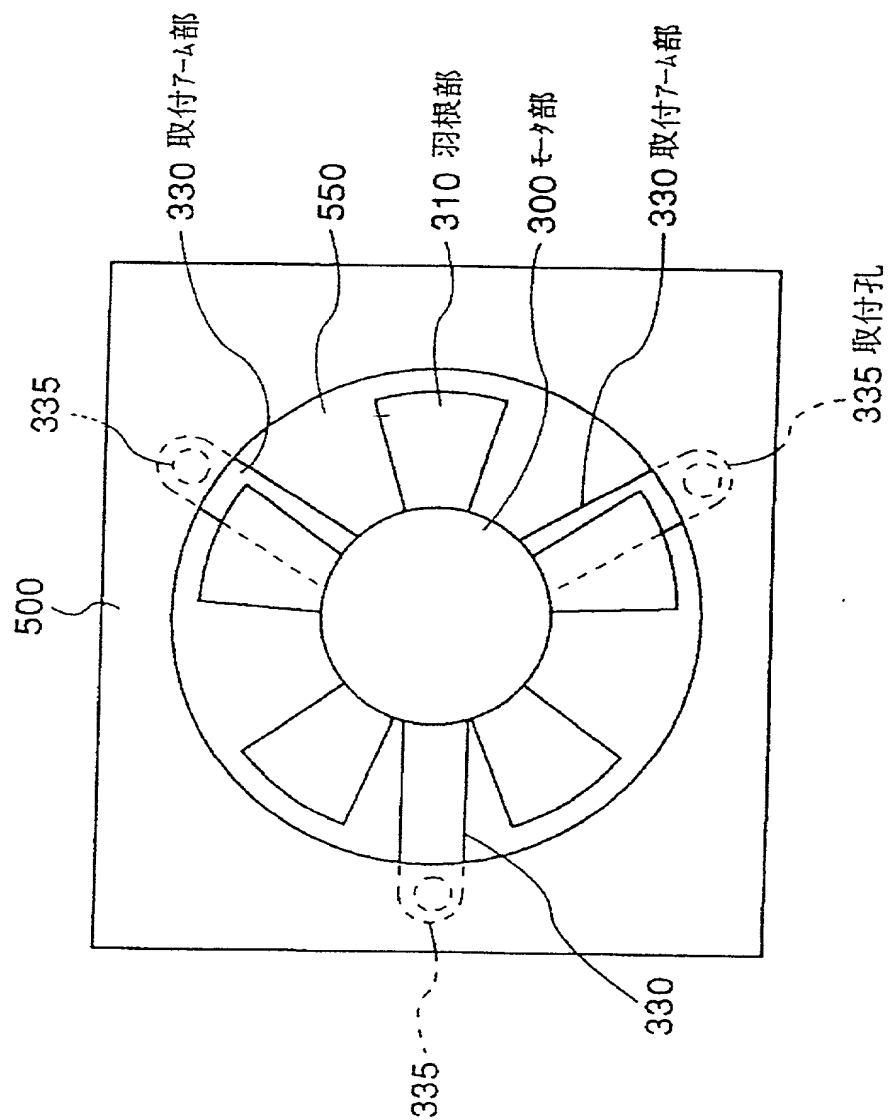


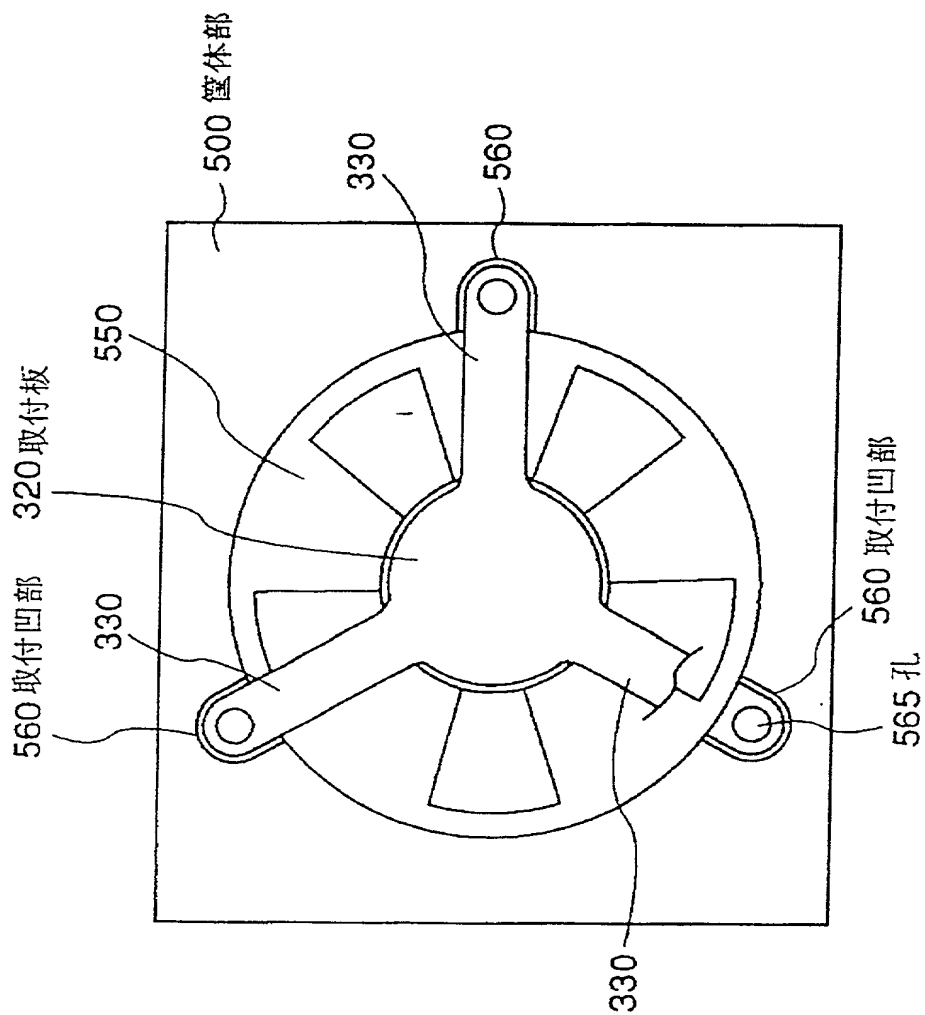
Fig. 5

【図6】

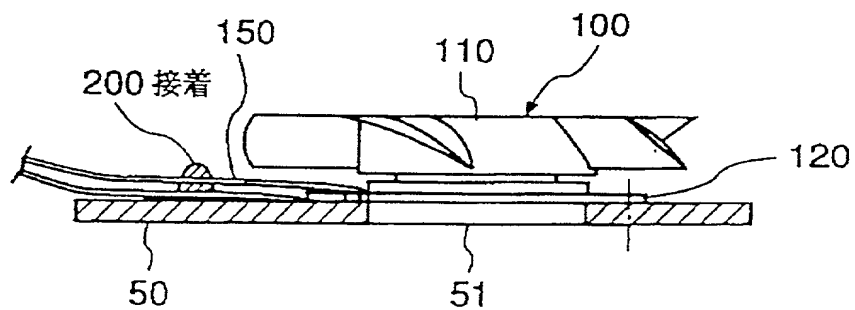
Fig. 6



【図7】



【図8】



668T50" 992ET60

Fig. 7

Fig. 8

DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

FAN MOTOR AND HEAT SINK BUILT-IN TYPE FAN MOTOR

the specification of which:

(check one) ☒ is attached hereto

☐ was filed on _____, as
Application Serial No. _____
and was amended on _____.
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56*

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

			priority claimed
<u>P. Hei-10-140025</u>	<u>Japan</u>	<u>21/May/1998</u>	<u>X</u>
(Number)	(Country)	(Day/Month/Year Filed)	yes no
<u> </u>	<u> </u>	<u> </u>	<u> </u>
(Number)	(Country)	(Day/Month/Year Filed)	yes no
<u> </u>	<u> </u>	<u> </u>	<u> </u>
(Number)	(Country)	(Day/Month/Year Filed)	yes no

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.)

(Filing Date)

(Status: patented, pending, abandoned)

Power of Attorney: As a named inventor, I hereby appoint Sean M. McGinn, Reg. 34,386, and Frederick W. Gibb, III, Reg. No. 37,629 as attorneys and/or agents to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. All correspondence should be directed to McGinn & Gibb, P.C., 1701 Clarendon Boulevard, Suite 100, Arlington, Virginia 22201. Telephone calls should be directed to McGinn & Gibb, P.C. at (703) 294-6699.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the

United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Full Name of Third
Joint Inventor, If Any _____

Inventor's Signature _____ Date _____

Residence _____

Citizenship _____

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Full Name of Fourth
Joint Inventor, If Any _____

Inventor's Signature _____ Date _____

Residence _____

Citizenship _____

Post Office Address _____

(An additional sheet(s) is/are attached hereto if the present invention includes more than four inventors.)

*Title 37, Code of Federal Regulations, § 1.56:

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith toward the Patent and Trademark Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is canceled or withdrawn from consideration, or the application becomes abandoned.

(b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and (1) it establishes, by itself or in combination with other information, a prima facie case of unpatentability; or (2) it refutes, or is inconsistent with, a position the applicant takes in: (i) opposing an argument of unpatentability relied on by the Office, or (ii) asserting an argument of patentability.